WHAT IS CLAIMED IS:

1. A method for sampling at least one analog input signal, comprising:
   (a) feeding a MIMO system with said at least one analog input signal and discrete correction signals,
   (b) said MIMO system providing analog monitoring outputs being related to said at least one analog input signal and said discrete correction signals, wherein the relationship between said at least one analog input signal and said discrete correction signals to said analog monitoring outputs can be described by a MIMO model having accurate identification algorithm,
   (c) receiving said analog monitoring outputs and a synchronization clock and implementing a negative feedback control loop by feeding said MIMO system with discrete correction signals, in order to keep at least one of said analog monitoring outputs to be within a predefined constraints,
   (d) identifying a model of the at least one analog input signal sampler, for creating an internal representation of the relationships between a digital representation of said discrete correction signals to one or more of the input signals to said MIMO system,
   (e) calculating a digital output signal by using said digital representation of said discrete correction signals and said model of said at least one analog input signal sampler, whereby said digital output signal represents said at least one analog input signal.
2. The method of claim 1, wherein said MIMO system is selected from the group consisting of continuous MIMO system, and MIMO system having a unified model, and continuous MIMO system having a unified model.
3. The method of claim 2, wherein said MIMO system is time varying according to said synchronization clock.
4. The method of claim 2, wherein the value of said discrete correction signals is selected from the group consisting of at least two predefined values, and at least two predefined waveforms.

5. The method of claim 2, wherein the relationship between said analog monitoring outputs and said synchronization clock to said discrete correction signals can be described by a control unit model.

6. The method of claim 2, wherein said MIMO system is a linear MIMO system.

7. The method of claim 5, wherein said calculating a digital output signal is calculated by using, in addition, said control unit model and deterministic or probabilistic set of predefined constraints on said analog monitoring outputs.

8. The method of claim 5, wherein said calculating a digital output signal is calculated only up to a predefined partial reconstruction of said at least one analog input signal.

9. The method of claim 5, wherein said identifying a model of said at least one analog input signal sampler is repeated occasionally within a training period, comprising: (a) feeding said MIMO system with at least one known analog signal in said training period, (b) reading said digital representation of said discrete correction signals, (c) identifying said model of said at least one analog input signal sampler by applying system identification algorithm.

10. The method of claim 9, wherein said at least one known analog signal is produced by feeding known digital signals to a digital to analog converter, driving said at least one known analog signal.

11. The method of claim 5, where said identifying a model of said at least one analog input signal sampler is performed in the background by interleaving input and training signals.

12. The method of claim 5, wherein said identifying a model of said at least one analog input signal sampler is repeated occasionally within a training period, comprising: (a) feeding said MIMO system with at least one known analog signal in said training period, (b) feeding known discrete correction signals to part of said MIMO system inputs (c) reading said digital representation of said discrete correction signals, (d) identifying said model of said at least one analog input signal sampler by applying system identification algorithm.

13. The method of claim 5, wherein said identifying a model of said at least one analog input signal sampler comprising: using available a-priori statistical information about said at least one analog input signal.

14. The method of claim 5, wherein said at least one analog input signal sampler is enclosed in a system performing several signal processing functions and said identifying a model of said at least one analog input signal sampler comprising: using available information regarding said at least one analog input signal.
15. The method of claim 5, wherein said at least one analog input signal sampler is enclosed in a system comprising:
    (a) at least one additional MIMO system having a model and being fed by said at least one analog input signal or at least one other analog input signal
    (b) implementing at least one additional negative feedback control loop, and

    identifying said model of said at least one analog input signal sampler and said at least one additional MIMO system by applying joint model identification algorithm.
16. The method of claim 15, wherein said identifying a model of said at least one analog input signal sampler is repeated occasionally within a training period, comprising: (a) feeding said at least one additional MIMO system with at least one known analog signal in said training period, (b) reading said digital representation of said discrete correction signals, (c) identifying said model of said at least one analog input signal sampler and said at least one additional MIMO system by applying joint model identification algorithm
17. The method of claim 1, wherein said at least one analog input signal sampler is implemented as a multi-stage configuration.
18. The method of claim 1, wherein said MIMO system is a linear MIMO system, and said identifying said model of said at least one analog input signal sampler comprising LMS technique.
19. A method for sampling at least one analog input signal, comprising:
    (a) feeding a MIMO system with said at least one analog input signal and discrete correction signals,
    (b) said MIMO system is providing analog monitoring outputs being related to said at least one analog input signal and said discrete correction signals,

(c) implementing a negative feedback control loop by using said analog monitoring outputs and a synchronization clock, and feeding said MIMO system with discrete correction signals, in order to keep at least one of said analog monitoring outputs to be within a predefined constraints,

(d) calculating a digital output signal by using a digital representation of said discrete correction signals, and a model of said at least one analog input signal sampler, whereby said digital output signal represents said at least one analog input signal wherein the sampler can be considered as time invariant.

20. The method of claim 19, wherein said MIMO system is selected from the group consisting of continuous MIMO system, and MIMO system having a unified model, and continuous MIMO system having a unified model.

21. The method of claim 20, wherein said sampler can be considered as time invariant by using analog or digital compensation methods.

22. A method for sampling at least one analog input signal by a multi-stage sampler, comprising:

(a) for each stage of said sampler, except the first stage, a MIMO system is receiving at least one analog signal from the preceding stage and at least one discrete correction signal,

(b) the MIMO system of the first stage is receiving at least one discrete correction signal and at least one analog input signal to be sampled and digitally represented by said sampler as digital output,

(c) for each stage of said sampler, said MIMO system providing at least one analog monitoring output, wherein the relationship between said MIMO system input signals to said MIMO system at least one analog monitoring output can be described by a model,

(d) providing, for each stage of said sampler, at least one discrete correction signal to the signal entering the specific stage, by using information from predefined other stages, and said at least one analog monitoring output, and a synchronization clock, whereby said at least one discrete correction signal is performing a negative feedback

control loop in order to control said at least one analog monitoring output,

(e) receiving and storing, from each stage of said sampler, a digital representation of said at least one discrete correction signal,

(f) approximately identifying the model of said multi-stage sampler, by identifying the unknown parameters within said multi-stage sampler, for creating an internal representation of the relationship between the digital representation of the discrete correction signals, of all stages of said multi-stage sampler, to the analog signals of all stages of said multi-stage sampler,

(g) reconstructing a digital output signal using said digital representation of said discrete correction signals, and the identified model of said multi-stage sampler, whereby said digital output signal representing said at least one analog input signal.

23. The method of claim 22, wherein said MIMO system is a continuous MIMO system.

24. The method of claim 22, wherein the operation of each stage of said multi-stage sampler is selected from the group consisting of: dependent on at least one other stage, and dependent on predefined number of previous states of the multi-stage sampler, a combination of the aforementions.

25. The method of claim 23, wherein said MIMO system is time varying according to said synchronization clock.

26. The method of claim 24, wherein said MIMO system is time varying according to said synchronization clock.

27. The method of claim 23, wherein said at least one discrete correction signal is used for keeping the value of said at least one analog monitoring output to be within a predefined constraints.

28. The method of claim 24, wherein said at least one discrete correction signal is used for keeping the value of said at least one analog monitoring output to be within a predefined constraints.

29. The method of claim 24, wherein the controller of the last stage does not providing said at least one discrete correction signal to the signal entering its

stage.

30. The method of claim 23, wherein the value of each of said at least one discrete correction signal is selected from the group consisting of at least two predefined values, and at least two predefined waveforms.

31. The method of claim 24, wherein the value of each of said at least one discrete correction signal is selected from the group consisting of at least two predefined values, and at least two predefined waveforms.

32. The method of claim 22, wherein said reconstructing a digital output signal is reconstructed only up to a predefined partial reconstruction of said at least one analog input signal.

33. The method of claim 22, wherein said MIMO system is a linear MIMO system and said identifying said model of said multi-stage sampler comprising LMS technique.

34. The method of claim 33, wherein said LMS technique comprising Inter-stage-interference estimation.

35. The method of claim 22, wherein .

36. A multi-stage analog signals sampler, wherein each stage comprising:
   (a) amplifier amplifying an input analog signal,
   (b) means for approximately integrating the amplified analog signal,
   (c) means for decaying the integrated signal,
   (d) means for synchronizing said multi-stage analog signals sampler,
   (e) means for comparing the integrated amplified analog signal with a threshold, and adding at least one predefined correction to said amplified analog signal, and registering the output of said comparing in a digital logic,
   (f) means for calculating a digital output signal representing the analog input signal to said multi-stage analog signals sampler.

37. multi-stage analog signals sampler, wherein each stage comprising:
   (a) an amplifier amplifying an analog input signal,
   (b) means for making said amplifier dependent on a synchronization clock synchronizing said multi-stage analog signals sampler
   (c) a circuit featuring a time constant on the order of the clock duration

that is modifying the amplified signal,

(d) means for providing, for each stage of said sampler, at least one discrete correction signal to the signal entering the specific stage, by using information from predefined other stages, and said at least one analog monitoring output, and said synchronization clock, whereby said at least one discrete correction signal is performing a negative feedback control loop in order to control said at least one analog monitoring output,

(e) means for receiving and storing, from each stage of said multi-stage analog signals sampler, a digital representation of said at least one discrete correction signal,

(f) a DSP for calculating a digital output signal representing said analog input signal.

38. The method of claim 37, where said means for providing, for each stage of said sampler, at least one discrete correction signal is comparing the modified amplified analog signal with a threshold, and adding at least one predefined correction to said modified amplified analog signal or to a later stages.

39. A parallel multi-stage analog signals samplers, comprising:

(a) plurality of parallel analog signal samplers sampling at least two different analog input signals,

(b) said plurality of parallel analog signal samplers are placed on the same silicon substrate, featuring crosstalk between said plurality of parallel analog signal samplers,

(c) a common DSP for treating said crosstalk effect,

(d) whereby each stage of each multi-stage analog signals sampler comprising: amplifier amplifying an input analog signal, integration means for integrating the amplified analog signal, a synchronization clock synchronizing said multi-stage analog signals sampler, a controller for comparing the integrated amplified analog signal with a threshold, and adding at least one predefined correction to said amplified analog signal, and registering the output of said comparing in a digital logic.